AEM
Association of Equipment Manufacturers

Headquarters
6737 W. Washington Street, Suite 2400
Milwaukee, WI 53214-5650
T: 414.272.0943

aem.org
aem@aem.org
Toll free: 866.236.0442

November 9, 2020

The Honorable Sonny Perdue
Secretary
U.S. Department of Agriculture
1400 Independence Ave., S.W.
Washington, DC 20250

RE: Docket ID No. USDA–2020–0008 Innovative Technologies and Practices for the Agriculture Innovation Agenda

Dear Secretary Perdue:

The Association of Equipment Manufacturers (AEM) appreciates the opportunity to comment on USDA's Agriculture Innovation Agenda priorities.

AEM is the U.S.-based international trade group representing off-road equipment manufacturers and suppliers, with more than 1,000 companies and more than 200 product lines across the agriculture, construction, forestry, mining, and utility-related industry sectors worldwide. Collectively, the equipment manufacturing industry in the United States supports 2.8 million jobs and contributes roughly $288 billion per year to the U.S. economy.

Our members are on the cutting edge of equipment innovation, which will be vital to achieving USDA's goal of increasing food production by forty percent while decreasing inputs by fifty percent. We look forward to any opportunities to further coordinate with USDA to improve the competitiveness and environmental stewardship of America's farmers and ranchers.

AEM, through The Context Network—a leading agricultural research firm—has conducted a comprehensive study of the environmental benefits of precision agriculture as they relate to five technologies: auto guidance/steer, section control, variable rate, machine and fleet analytics, and precision irrigation. All of these tools are widely available today from a variety of competing brands. It is important to state that the production increases and input reductions listed below are directly attributable to these five equipment innovations alone. The results do not take into account benefits achieved through other modern agricultural advances, such as seed traits or the latest chemistries. We found that substantial sustainability gains can be reached by increased adoption of these five technologies, some of which have been on the market for over 20 years.

Auto Guidance/Steer

Auto-steer uses GPS signals to automatically control equipment while seeding, spraying, applying fertilizer and harvesting. This reduces row overlap of farming operations, leading to substantial fuel and input savings.

Current Adoption Rate by Crop:

- Corn – 60-percent
- Soybean – 60-percent
- Cotton – 80-percent
- Peanuts – 65-percent
- Wheat – 60-percent
- Sorghum – 50-percent
- Tubers – 80-percent
- Sugar Beets – 80-percent
- Hay and Forage – 25-percent

Machine Section Control

Machine section control technology turns planter, fertilizer or sprayer sections on or off in rows that have been previously seeded/sprayed, during headland turns, point rows or near waterways. This technology also allows tillage tools to adjust drag and depth.

Current Adoption Rate by Crop:

- Corn – 45-percent Fertilizer Application / 22-percent Herbicide Application
- Soybean – 45-percent Fertilizer Application / 22-percent Herbicide Application
- Cotton – 45-percent Fertilizer Application / 22-percent Herbicide Application
- Peanuts – 45-percent Fertilizer Application / 22-percent Herbicide Application
- Wheat – 45-percent Fertilizer Application / 22-percent Herbicide Application
- Sorghum – 45-percent Fertilizer Application / 22-percent Herbicide Application
- Tubers – 45-percent Fertilizer Application / 22-percent Herbicide Application
- Sugar Beets – 45-percent Fertilizer Application / 22-percent Herbicide Application
- Hay and Forage – 10-percent Fertilizer Application / 5-percent Herbicide Application

Variable Rate

Variable rate technology uses sensors and/or preprogrammed maps to vary the amount of seed, fertilizer and crop protection products that are applied, based on varying conditions within a field.

Current Adoption Rate by Crop:

- Corn – 32-percent Fertilizer Application / 13-percent Herbicide Application
- Soybean – 32-percent Fertilizer Application / 13-percent Herbicide Application
- Cotton – 54-percent Fertilizer Application / 13-percent Herbicide Application
- Peanuts – 54-percent Fertilizer Application / 13-percent Herbicide Application
- Wheat – 54-percent Fertilizer Application / 13-percent Herbicide Application
- Sorghum – 54-percent Fertilizer Application / 13-percent Herbicide Application
- Tubers – 54-percent Fertilizer Application / 13-percent Herbicide Application
- Sugar Beets – 54-percent Fertilizer Application / 13-percent Herbicide Application
- Hay and Forage –15-percent Fertilizer Application / 2-percent Herbicide Application

Machine and Fleet Analytics

Real-time monitoring of equipment provides information such as GPS location, equipment idling time, traffic control and route suggestions, and the flagging of potential maintenance issues, helping producers utilize their equipment more efficiently.

Current Adoption Rate by Crop:

- Corn – 12-percent
- Soybean – 12-percent
- Cotton – 12-percent
- Peanuts – 12-percent
- Wheat – 12-percent
- Sorghum – 12-percent
- Tubers – 12-percent
- Sugar Beets – 12-percent
- Hay and Forage – 12-percent

Precision Center Pivot Irrigation

Sensor technology enables center-pivot systems to switch on/off and apply different amounts of water to different areas of the field.

Current Adoption Rate by Crop:

- Corn – 22-percent
- Soybean – 22-percent
- Cotton – 22-percent
- Peanuts – 22-percent
- Wheat – 9-percent
- Sorghum – 9-percent
- Tubers –17-percent
- Sugar Beets –17-percent
- Hay and Forage – 0-percent

Accordingly, the Context Network study further showed that current adoption rates of the above five technologies (auto guidance, section control, variable rate, analytics, and precision irrigation) have achieved:

- 4-percent increase in crop production,
- 4-percent reduction in water use,
- 6-percent reduction in fossil fuel use,
- 7-percent improvement in the placement of fertilizer, and
- 9-percent efficiency increase in herbicide application.

To put these environmental benefits in perspective:

- The U.S. would have to farm an additional 13.75 million acres of land to reach the same harvest levels if not for production increases due to precision agriculture tools.
    - Equivalent area to 6.1 Yellow Stone National Parks.
- Use of 40,000,000 pounds of herbicide have been avoided.
- 820,000 Olympic swimming pools of water have been saved.
- 188,000,000 gallons of fossil fuels were not burned.
    - Same as taking 300,000 cars off the road.

If U.S. agriculture reached “full adoption” of these five precision agriculture technologies, which we define as 95-percent, we would see additional environmental benefits of:

- 6-percent production increase,

- 20-percent less water use,
- 15-percent less fossil fuel burned,
- 14-percent improved fertilizer placement, and
- 15-percent more efficient use of herbicides.

It is also worth nothing there is a wide range of solutions available today in terms of cost and performance. Even once a farmer has adopted an entry-level version, there are significant gains that can be achieved as they upgrade to systems with higher levels of performance. For example, in GPS auto-guidance, going from 3” of accuracy to less than 1” can have a significant reduction in overlap over several thousand acres.

Additionally, soil compaction caused by wheel traffic can reduce yields due to restriction of root growth and nutrient and water availability. However, auto-guidance/steer systems make Controlled Traffic Farming (CTF) possible. CTF improves efficiencies by creating permanent traffic lanes in fields, leaving 80-90% untouched by compaction.

Modern Milking Systems

According to industry experts, producing one gallon of milk today requires around 90-percent less land, 65-percent less water, and generates 76-percent less manure when compared to dairy farms a century ago. This translates into a 63-percent smaller carbon footprint per gallon of milk.

Traditional parlor milking operations were a big part of these sustainability improvements. Today’s widely available modern parlor systems and Automated Milking Installations (AMIs), both of which utilize advanced robotics to varying degrees, can drive further environmental gains.

These technologies allow the animal to behave more naturally, deciding when to eat, drink, rest, be milked and when not to be milked without “behavior modification.” In addition to reducing stress, these systems further enhance animal health by preventing disease and enabling faster diagnosis when disease does occur. For example, most modern milking machines come with automated mastitis protection and precision teat sprayers to help keep the teats free from pathogens.

This technology helps a cow to reach her full genetic potential for milk production while reducing the risk of “overmilking.” This improves animal feed utilization, translating into the more efficient use of row crop inputs such as land, water, fertilizer and crop protection products for milk production.

In regards to AMIs, AEM estimates 800-900 U.S. dairy farms use robotics today to milk just 3-percent of U.S. dairy cows. This means 35,000 dairy farms are using older systems to milk over 8,500,000 cows.

Additional adoption of robotic milking systems will exponentially increase the data dairy farmers collect, unlocking vast opportunities for correlation with additional data from on/around farm sources (weather, feeding/nutrition, genetics, etc.). This will speed a revolutionary decision-making process that can benefit the animal, the farmer, as well as the environment.

Subsurface Irrigation

An opportunity exists where a closed-loop water management, also referred to as sub-irrigation, collects water from the field during wet periods and then recirculates through the field using a system of perforated plastic tubes during dry periods. Control gates installed on the system then are used to initiate and end drainage, and then later these same gates are used to regulate the height of the water table during irrigation. Some of the potential advantages to this system include recycling water through sub-surface drainage lines to prevent “run-off” water from entering U.S. waterways, reducing reliance on aquifers for irrigation water, reducing irrigation water volume due to eliminating evaporation, and yield improvements.

Multiple-year research conducted by Beck’s Hybrids shows a consistent 24.7 bushel increase over the non-irrigated control. Missouri University Drainage and Subirrigation Research conducted similar trials from 2004 to 2013 with results that show an average of 52 bushel per acre increase. Using the USDA estimate of $3.60 price for a bushel of corn, sub-irrigation increases revenue range of $88.92 to $187.20 per acre. This calculation of estimated revenue increase ignores the potential cost savings created from better nitrogen efficacy and lower water usage during irrigation when compared to over-head irrigation systems.

ISOBUS Agricultural Electronics Compatibility Standard

The International Standard Organization – BUS (ISOBUS) was created to achieve cross-brand cooperation and performance data communication on agriculture and forestry machinery. This is done by using standardized data protocols and connectivity to increase precision farming functions, similar to a USB port for the tractor.

The Agricultural Industry Electronics Foundation (AEF) and ISO 11783-1 has multiple tools ready today for USDA to use in research and tracking performance of current programs. The protocols are published under ISO 11783 (International Standards Organization) and supported by the AEF organization globally. These protocols are recognized by all major tractor brands sold in the U.S. and could be the method to streamline the data for many research topics using precision agriculture.

Research programs can be managed front to back using the standardized precision agriculture functionalities on ISOBUS-certified agriculture machines from the AEF. These are precision agriculture functions and software protocols already in place and more machinery can be certified by the National Tractor Test Laboratory, University of Nebraska. The environment, USDA and producers would benefit greatly by utilizing this already agreed machinery standard for data collection and communication.

How USDA Programs Can Increase Technology Adoption

Rural Development—The widely-available technologies above require enabling infrastructure for a producer to realize their full benefit. While many USDA rural development programs already apply significant resources to expanding broadband connectivity, we believe a greater emphasis on wireless coverage over croplands and rangelands would speed adoption of precision agriculture tools. Given the traditional focus federal efforts have placed on connecting anchor institutions—schools, hospitals and libraries—through fiber land lines, USDA is well positioned to highlight the increasing need to change the way we think about rural connectivity.

Furthermore, USDA should work to ensure the Federal Communications Commission (FCC) recognizes the critical role the Global Positioning System (GPS) plays in precision agriculture.

Simply put, precision agriculture cannot operate without highly accurate and reliable GPS signals.

Natural Resource Conservation Service (NRCS)—Many stewardship algorithmic models being used today by policy makers, such as COMET-Farm, do not give modern precision agriculture tools their full due. Producers would have additional incentives to invest in precision agricultural tools if their environmental benefits were properly recognized in the models that drive policy decisions.

NRCS should use its considerable influence in the conservation community to push for a more accurate accounting of today's advanced equipment.

Environmental Quality Incentives Program—By soliciting U.S. Universities to collect data and growers to participate in a program using ISOBUS certified machinery, research could be done using ISO 11783 data on many different efficiencies and strategies to meet the AIA goals and Environmental Quality Incentives Program objectives. This could be grower incentive to share data from ISO 11783 capable machines to provide metrics and prove the reduction of inputs.

Data collected by these AEF-certified machines could result in expanding the technology of farm management information systems nationally and standardize all the field data collected across the country for USDA analysis. Research can be done using the standard AEF precision agriculture certified functionalities referred to above. By employing the standardized communication protocols and collecting this data from ISOBUS-capable machinery we can aggregate and analyze more and more farmer shared data from 2020-2050. The ISOBUS standard would enable USDA to manage and measure year-over-year results, tracking data each year towards program goals and to meet the time frame proposed.

Conclusion

American agriculture is experiencing a technological revolution. AEM is excited about the tremendous benefits farmers, ranchers and the environment can realize with increased adoption of these proven and widely available equipment technologies. AEM looks forward to working with USDA to see that the Ag Innovation Agenda achieves its goals. For further information please contact Nick Tindall, AEM's Senior Director of Regulatory Affairs and Agriculture Policy, at ntindall@aem.org or 202-701-4287.

Sincerely,

Dennis J. Slater
President